

Bryophytes from the Fiji Islands, VIII.

The genus *Lejeunea* Libert (1820) (Jungermannniopsida)

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Abstract: Research done on Fiji Islands during this century contributed a lot to the knowledge of its rich bryoflora. At present 27 species, one subspecies and one variety of the genus *Lejeunea* Libert (1820) are known from the islands. *Lejeunea compacta* (Stephani) Stephani (1915), *L. eifrigii* Mizutani (1970), *L. exilis* var. *abnormis* (Herzog) G.E. Lee (2013), *L. flava* ssp. *moorei* (Lindberg.) R.M. Schuster (1957), *L. neelgherriana* Gottsche (1845), *L. papilionacea* Prantl (1892), *L. pulchriflora* (Pearson) G.E. Lee et al. (2016), *L. reineriae* Ilkiu-Borges (2005), and *L. tuberculosa* Stephani (1915) are newly reported from Fiji and two species new to science are to be described. Critical species are discussed and illustrated. The distribution pattern of all species is analyzed.

Key words: *Lejeunea*, Fiji, Melanesia, Pacific, Polynesia.

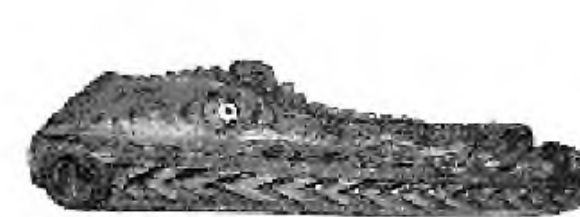
Introduction

The first *Lejeunea* Libert, 1820 record published from Fiji Islands was *Lejeunea sinclairii* Mitten from the collection of Seemann made in 1860 (Mitten 1862), which proved to be *Thysananthus fruticosus* (Lindenberg, Gottsche) Schiffner 1893 (Sukkharak 2015). Seemann's "Flora Vitiensis" (1865-1873) contains the description of further three *Lejeunea* species described by Mitten: *Lejeunea crassiretis* Mitten (1871), *L. uvifera* Mitten (1871) – now *L. flava* (Swartz) Nees (1838) and *L. procumbens* Mitten (1871) (Söderström et al. 2011). The next major contribution came much later, by Campbell (1971) who added *L. gracilipes* (Taylor) Spruce, 1884; *L. nietneri* (Stephani) Mizutani, 1973 (syn. of *Lejeunea flavida* Mitten, 1861) and *L. subigiensis* (Stephani) Stephani (1896). A breakthrough was the revision of the South Pacific *Lejeunea* species by Hürlimann (1993), who summarized the previous records and added his own collection and a key to the species known from the area. He recorded already 12 *Lejeunea* species from Fiji Islands, of which three were since transferred to other genera and one proved to be synonym. He introduced a new name: *Lejeunea mimula* Hürlimann (1993) for the illegitimate *Lejeunea luteola* (Stephani) Mizutani (1970) and tried to clarify the position of *Lejeunea patersonii* (Stephani) Stephani, 1915.

During 2003 Tamás Pócs with his wife Sarolta Pócs made a throughout collection in the islands. Then in 2008 and 2011 the Field Museum (Chicago, U.S.A.) organized intensive field trips with several participants in cooperation with the South Pacific Regional Herbarium, University of the South Pacific (see von Konrat et al 2011; Pócs et al. 2011), which resulted in five more *Lejeunea* species new to the islands and finally two species to be described as new to science. In the present paper we add seven further *Lejeunea* species and a variety, raising the number of *Lejeunea* taxa known from the flora of Fiji Islands to 27 species, one subspecies and two varieties, using the nomenclature of Söderström et al. (2016).

Materials and methods

In case of already published records in the summaries by Hürlimann (1993), Söderström et al. (2011), and Pócs et al. (2011) we only refer to the concerned sources and give detailed data only for the new island records. We enumerate synonyms only in exceptional cases and we refer to the full synonymy given in Zhu & So (2001), Söderström et al. (2011), and Lee (2013).



Abbreviations used in the text:

FIJ – Fiji Islands without allocation to an island;
Ka – Kadavu;
Ov – Ovalau;
Ta – Taveuni;
Va – Vanua Levu;
VL – Viti Levu Island.

EGR – Herbarium of the Eszterházy Károly University, Eger, Hungary;
F – Herbarium of the Field Museum, Chicago, USA;
HSNU – Herbarium of the East China Normal University, Shanghai, China;
SPRH – South Pacific Regional Herbarium, Suva, Fiji.

Enumeration of the taxa of genus *Lejeunea* Libert (1820) known from Fiji Islands

Lejeunea alata Gottsche, 1845

References: Söderström et al. (2011: 419); Pócs et al. (2011: 468), VL.

New records: New to Ka: on the upper SW slopes of Mt. Delainabukalevu (Mt. Washington).

Epiphyllous in elfin forest below summit, at 700-800 m. E.A. Brown & M. von Konrat 1178/E, J, M and N. Altogether 14 records.

Illustrations: Zhu & So (2001: 138, fig. 53); Lee (2013: 395, figs 37-51).

Distribution: Palaeotropic species distributed from East Africa to Samoa (Miller et al. 1983; Wigginton 2009).

Lejeunea anisophylla Montagne, 1843

References: Söderström et al. (2011: 419); Pócs et al. (2011: 468).

It is far the commonest species all over the islands, occurring on different substrates, having already 97 records. It is the commonest on lowland and low montane areas in an altitudinal range from sea level to 600 m, the highest record came from 750 m.

Illustrations: Zhu & So (2001: 157, fig. 62); Lee (2013: 400, figs 68-82).

Distribution: A widespread Palaeotropical species distributed all over tropical Africa, Asia, Australia and in the Pacific.

Lejeunea apiculata Sande Lacoste, 1855

References: Söderström et al. (2011: 419); Pócs et al. (2011: 469), VL. Epiphyllous, at 1000 m.

Illustrations: Zhu & So (2001: 165, fig. 64), as *Stenolejeunea apiculata*; Lee (2013: 404, figs 83-100).

Distribution: Tropical Asia, Australia and in the Pacific.

Lejeunea caviloba (Stephani) Stephani in Bescherville, 1898 (Figs 1-2)

References: Hürlimann (1993: 7); Söderström et al. (2011: 419), VL. New to Ta: Wainibau Valley on the SE coast, below the waterfalls, at 10 m, epiphyllous. S. & T. Pócs 03286/AU. Altogether five records, from 1-430 m alt.

Distribution: A mostly Pacific species (from New Caledonia to Hawaii) with occurrence also on Java (Miller et al. 1983).

Lejeunea cocoes Mitten, 1861

References: Söderström et al. (2011: 419); Pócs et al. (2011: 469), Ta, VL.

New records: New to Ka: Central part of the island, on the coastal ridge N of Vunisea, corticolous in dry evergreen *Gymnostoma vitiense* (Casuarinaceae) forest. S. & T. Pócs 03303/Z; S coast E of Vunisea, in coastal *Barringtonia* forest, 1-4 m, on bark. S. & T. Pócs 03308/D; 2-3 km NNE of Vunisea, along the Namara Road, on decaying wood in lowland rainforest at 120-165 m S. & T. Pócs 03300/G. SW end of the island, SE of Nabukalevu-ira village, coastal woodland of *Barringtonia asiatica* and *Hibiscus tiliaceus* just above the tidal level, on coconut base. T. Pócs & S. Bakata 1173/L. Same place, higher up on the slope, in *Barringtonia edulis* forest, 10-100 m, on bark. T. Pócs & S. Bakata 1174/AM, AO and AW. Altogether 20 records, mostly from coastal forests or coconut woodlands at 1-100 m alt, some up to 800 m.

Illustrations: Mizutani (1963: 177, figs. 10-18); So & Zhu (1998: 138, fig. 1); Lee (2013: 406, figs 101-116).

Distribution: Indomalasian-Pacific species with scattered occurrences from Chagos Archipelago to Fiji.

Lejeunea compacta (Stephani) Stephani, 1915

New records: New to Fiji Islands: Ka, Mt. Delainabukalevu (Mt. Washington), NW edge of summit crater. In cyclone damaged *Metrosideros* forest at 800 m alt., on *Metrosideros* bark, sterile. M.A.M. Renner 5771 (EGR, F and NSW 895648). Although only male plants were seen, the male branch agrees well with the description of Mizutani (1961).

Illustrations: Mizutani (1961: 158, figs 16-24); Lee (2013: 409: figs. 117-134).

Distribution: Hitherto known only from Japan, Korea and from Sabah, East Malaysia (Lee 2013).



***Lejeunea crassiretis* Mitten, 1873**

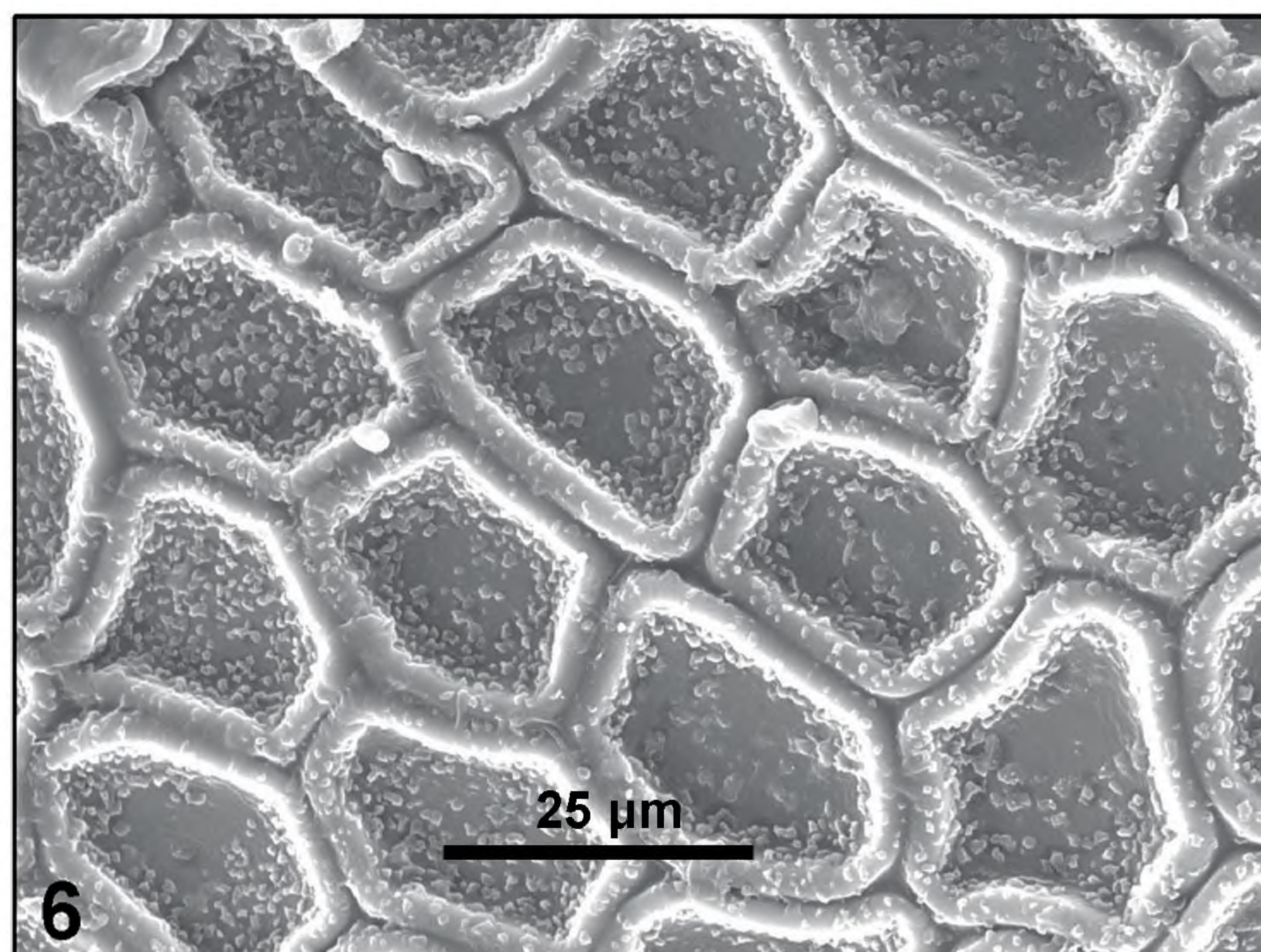
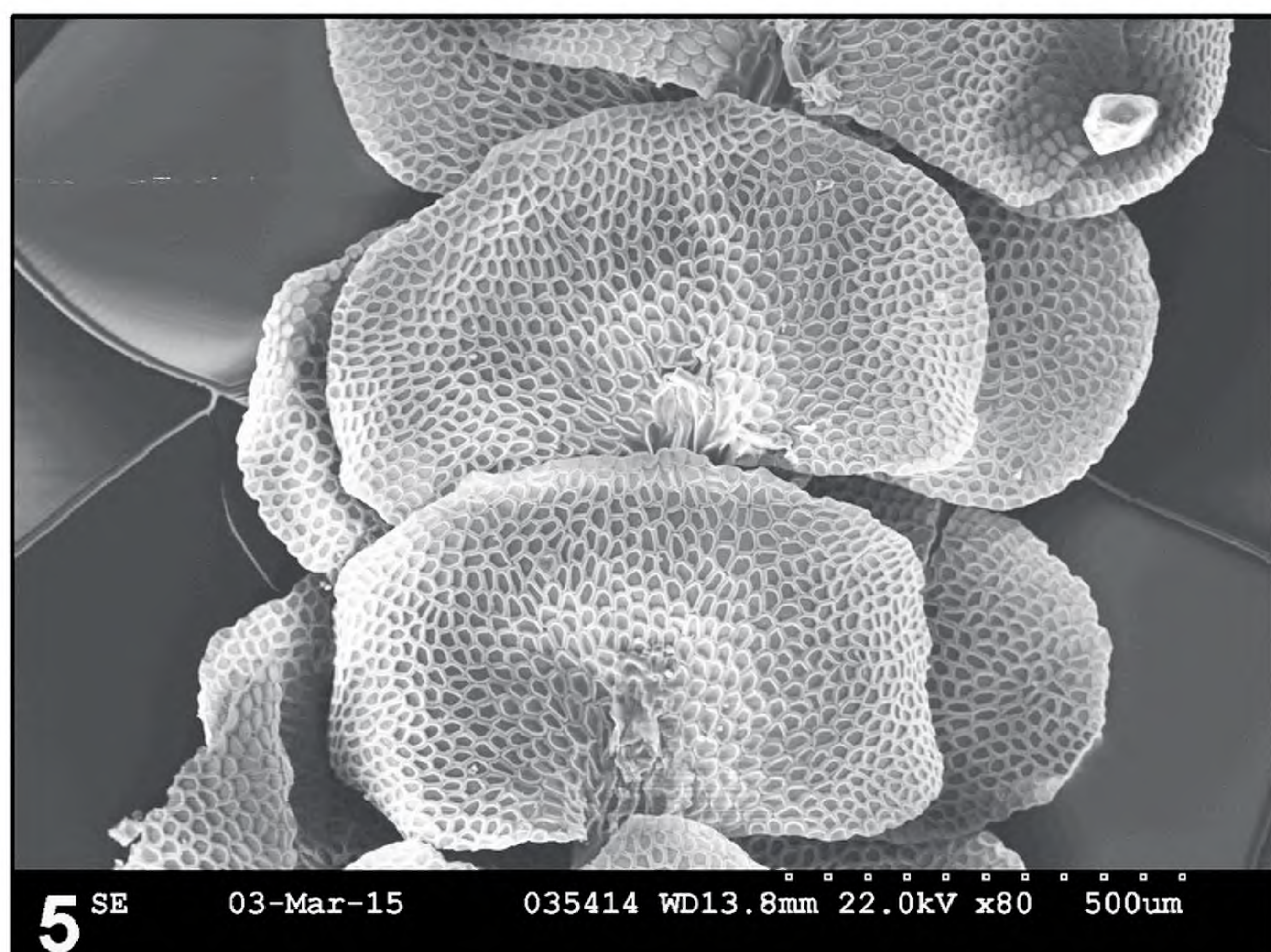
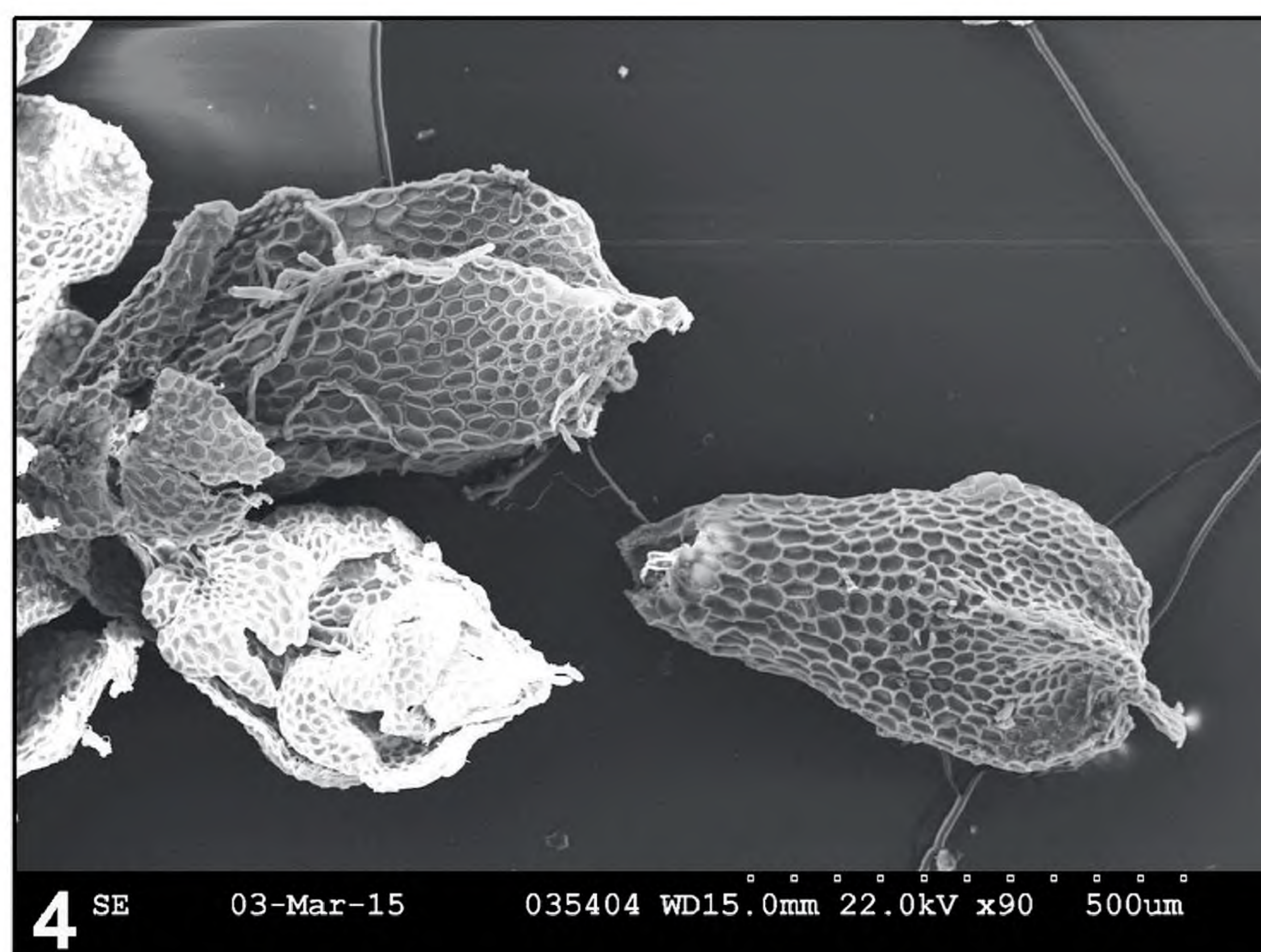
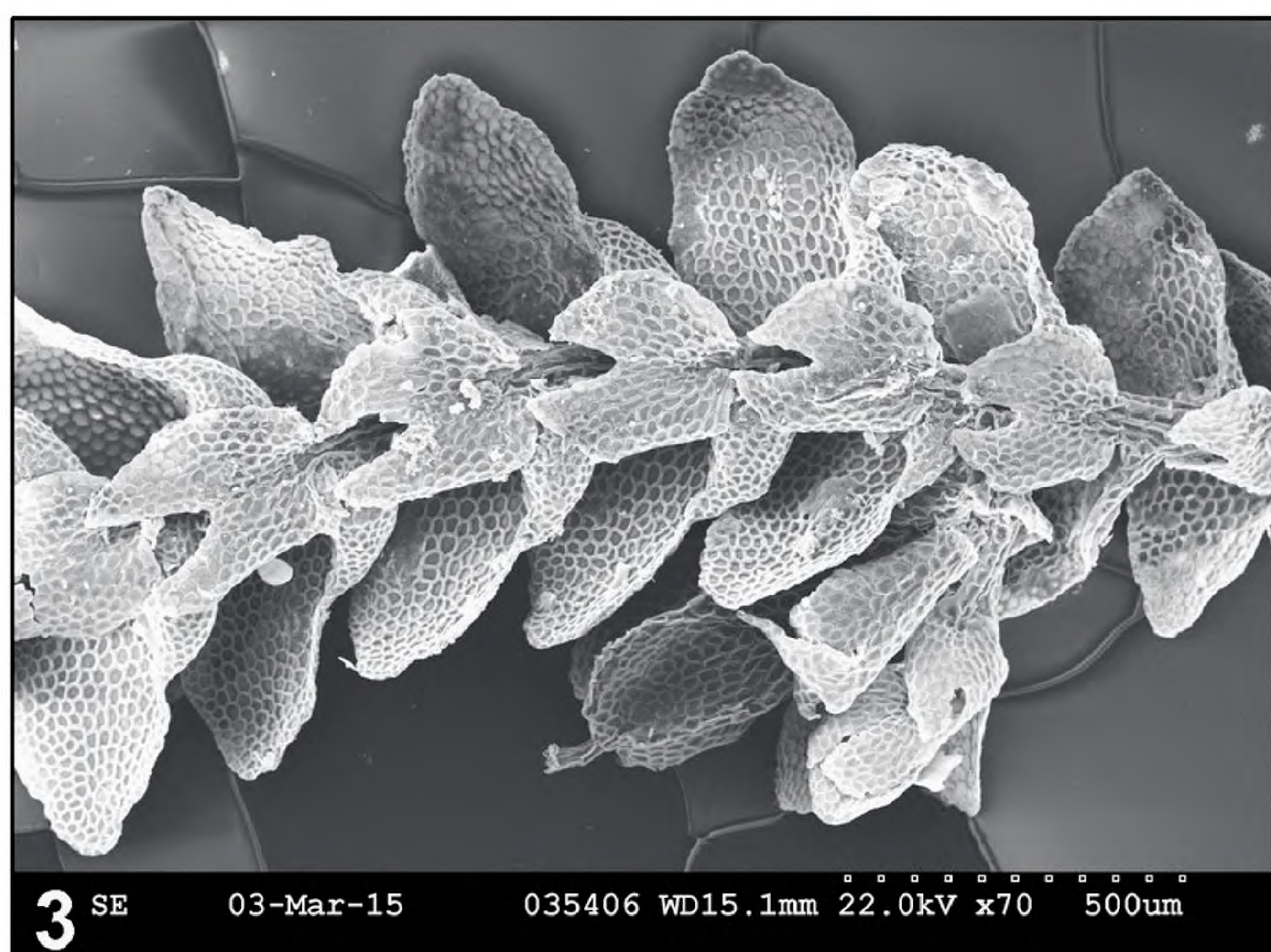
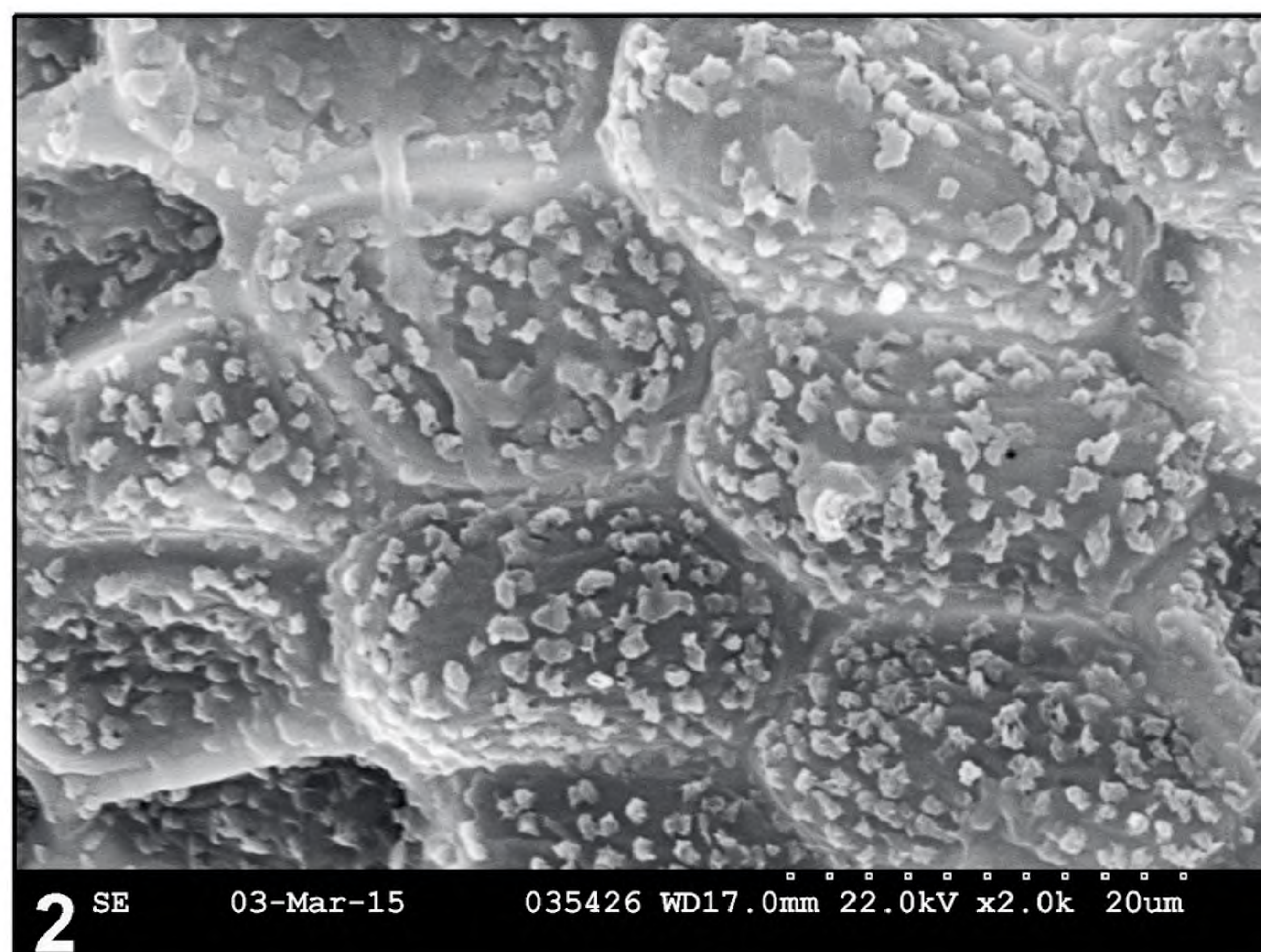
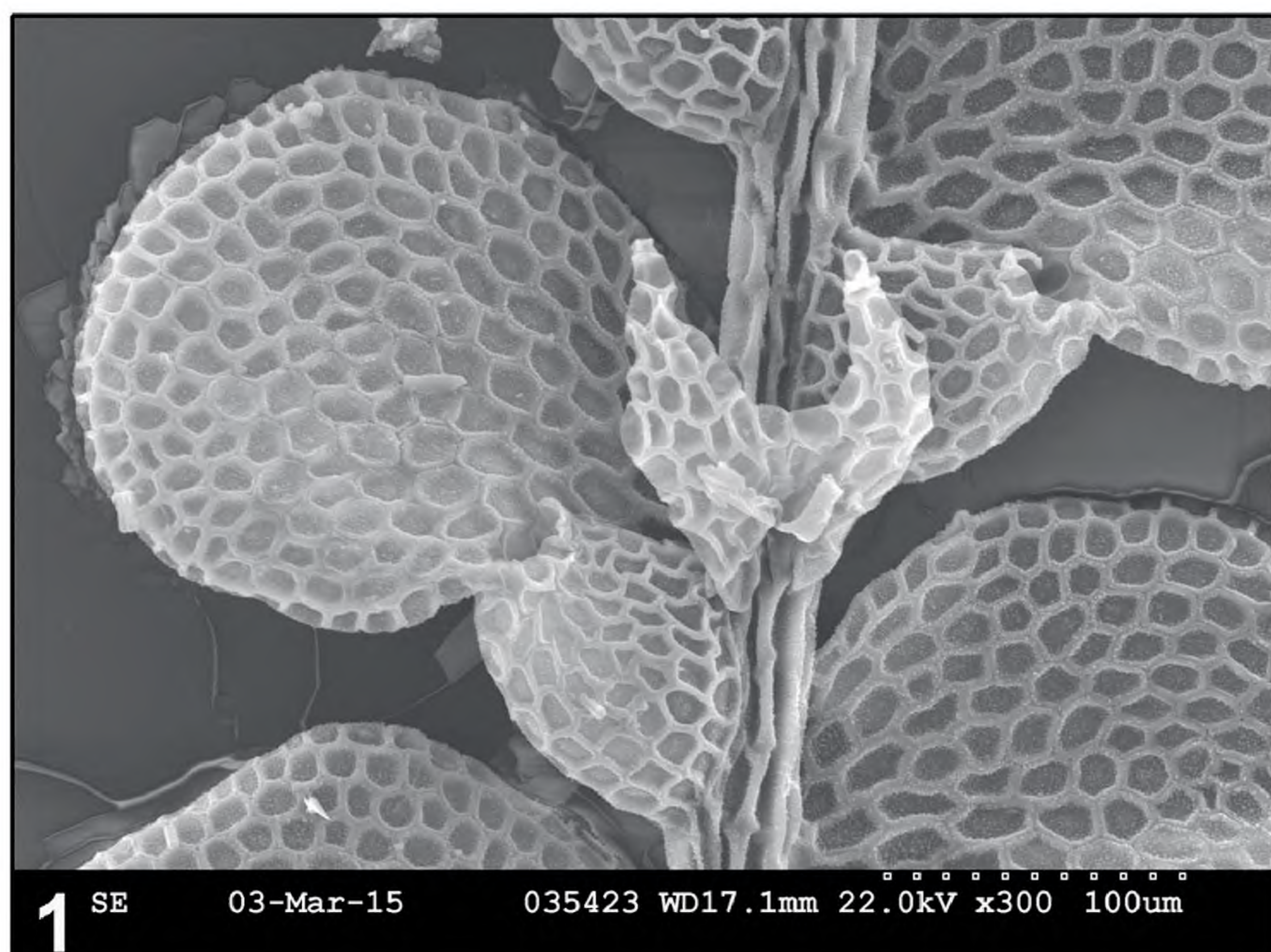
References: Mitten in Seemann (1873: 414); Thiers (1983), FIJ; Söderström et al. (2011: 419). Campbell (1971: 14) supplied seven records from VL: at altitudes between sea level and 825 m.

We did not come across or did not recognize this species in our collections. It seems to be an

endemic of Fiji Islands.

***Lejeunea discreta* Lindenberg in Gottsche et al., 1845** (Figs 3-4)

References: Hürlimann (1993: 10), VL; Söderström et al. (2011: 419); Pócs et al. (2011: 478), Ta.



Figures 1-6. Fijian *Lejeunea* species. 1-2: *Lejeunea caviloba* (Steph.) Steph. from Pócs 03286/AU: 1 – Ventral view; 2 – Cuticle ornamentation; 3-4: *Lejeunea discreta* Lindemb. from Sass-Gyarmati 1177/D: 3 – Ventral view; 4 – perianths; 5-6: *Lejeunea mimula* Hürlimann from von Konrat 1179/C: 5 – Ventral view; 6 – Cuticle ornamentation.



New records: New to Ka: SW slopes of Mt. Delainabukalevu (Mt. Washington), cloud forest at 550-650 m, on bark. A. Sass-Gyarmati 1177/D, L. Söderström 2011/189. Altogether 12 records from 80 to 1265 m alt.

Illustrations: Mizutani (1970: 237, fig. VII); Zhu & So (2001: 145, fig. 56); Lee (2013: 418, figs 180-191).

Distribution: A widespread Indomalesian-Pacific species occurring also in Australia.

***Lejeunea eifrigii* Mizutani, 1970**

New records: New to Fiji Islands: Ta, NE slope of Des Voeux (Devo) Peak, in mossy elfin forest at 1040-1150 m, on other epiphytic bryophytes. S. & T. Pócs 03279/CK.

Illustrations: Zhu & So (2001: 133, fig. 51); Lee (2013: figs 192-204).

Distribution: A widespread tropical Asian species known from Java, Sumatra, Sabah, Luzon, Papua New Guinea, New Caledonia, China, Japan, India, (Pócs 1995; Zhu & So 2001; Dey et al. 2007).

Lejeunea exilis* (Reinwardt, Blume, Nees) Grolle, 1979 var. *exilis

New records: New to Tonga Islands: on the volcanic island Tafahi, on bark of planted *Artocarpus incisa* tree along a forest road near Tafahi village, at 120 m alt. H. Hürlimann T 890 (Herb. Hürlimann).

References: Söderström et al. (2011: 419); Pócs et al (2011: 469), Ta, VL. New to Ka: Coastal ridge N of Vunisea, 40-80 m, on decaying bark in dry evergreen *Gymnostoma vitiense* (Casuarinaceae) forest. S. & T. Pócs 03303/H. Altogether 10 records from sea level to 1100 m alt.

Illustrations: Zhu & Grolle (2003: 103-104, figs 1-2); Lee (2013: 424, figs 205-224).

Distribution: It is an often overlooked, widespread Indomalesian-Australasian-Pacific species.

***Lejeunea exilis* var. *abnormis* (Herzog) G.E. Lee, 2013**

= *Byssolejeunea abnormis* Herzog, 1941

New records: New to Fiji Islands: Ta, along the road from Wairiki to Des Voeux Peak, at 715-750 m in montane rainforest, epiphyllous. S. & T. Pócs 03289/BY. SW part of the island, on foothills between Salialevu and Naqarawalu villages, in degraded rainforest at 100-200 m alt., on branches. S. & T. Pócs 03296/F p.p. VL: Coral Coast near Nabukawesi village in primary lowland rainforest at 30-60 m. S. & T. Pócs 03261/BY. Rairaimatuku Plateau 10 km SSE of Navai, epiphyllous and on the dead pseudostem of *Alpinia boia* (Zingiberaceae),

990-1010 m in mossy elfin forest. S. & T. Pócs 03274/AN and BQ. E spur of Delaitoga ridge along the Nabukawesi-Namosi road in cloud forest at 430 m. On *Alpinia boia* pseudostem. T. Pócs 1153/AU.

Illustrations: Lee (2013: 428, figs 225-235).

Distribution: The variety previously known only from Java and Peninsular Malaysia.

Lejeunea flava* (Swartz) Nees, 1838 ssp. *flava

References: Hürlimann (1993: 10); Söderström et al. (2011: 419); Pócs et al. (2011: 478), Ov, Ta, VL.

New records: New to Ka: along Vunisea-Namara road at 110-150 m, on bark in mesic evergreen forest. T. Pócs 1171/T.

Illustrations: Lee (2013: 429, figs 236-249).

Distribution: Very widespread pantropical species, from Fiji Islands with 19 records, from sea level to 950 m.

***Lejeunea flava* ssp. *moorei* (Lindberg) R.M. Schuster, 1957**

New records: New to Fiji Islands: Vi, Rairaimatuku Plateau, elfin forest along the Monasavu-Nandrau road 10 km SSE of Navai, at 990 m alt., on twigs. A. Sass-Gyarmati 1164/T. According to Schuster (1957: 161; 1980: 967) and Jones (1968: 549) this taxon fully deserves its status.

Illustrations: Paton (1999: 496, fig. 244).

Distribution: Hitherto it was known only from Ireland, the Azores, Madeira and the Canary Islands (Lockhart et al., 2012). Its full distribution and taxonomic value has to be clarified.

***Lejeunea flavida* Mitten, 1861**

= *Lejeunea nietneri* (Stephani) Stephani ex Watts, 1902 (synonym according to Mizutani 1974) References: Campbell (1971: 14); Miller et al. (1983: 180), VL.

Illustrations: Mizutani (1963: 173, fig. II, 1-9), as *Pycnolejeunea flavida* (Mitt.) Steph.

Distribution: Indomalesian-Pacific species, distributed from Sri Lanka to Samoa. According to Stephani (1915: 780) - 'valde communis'.

We did not come across this species in Fiji.

***Lejeunea gracilipes* (Taylor) Spruce, 1884**

= *Taxilejeunea gracilipes* (Taylor) Steph. 1914 References: Campbell (1971: 14), as *Taxilejeunea gracilipes* (Taylor) Steph. 1971: 26, Ta, Vi, Va.

Distribution: Southern Pacific species known from Fiji, Tahiti and Kermadec Islands (Miller et al. 1983), Samoa (Grolle 1980).



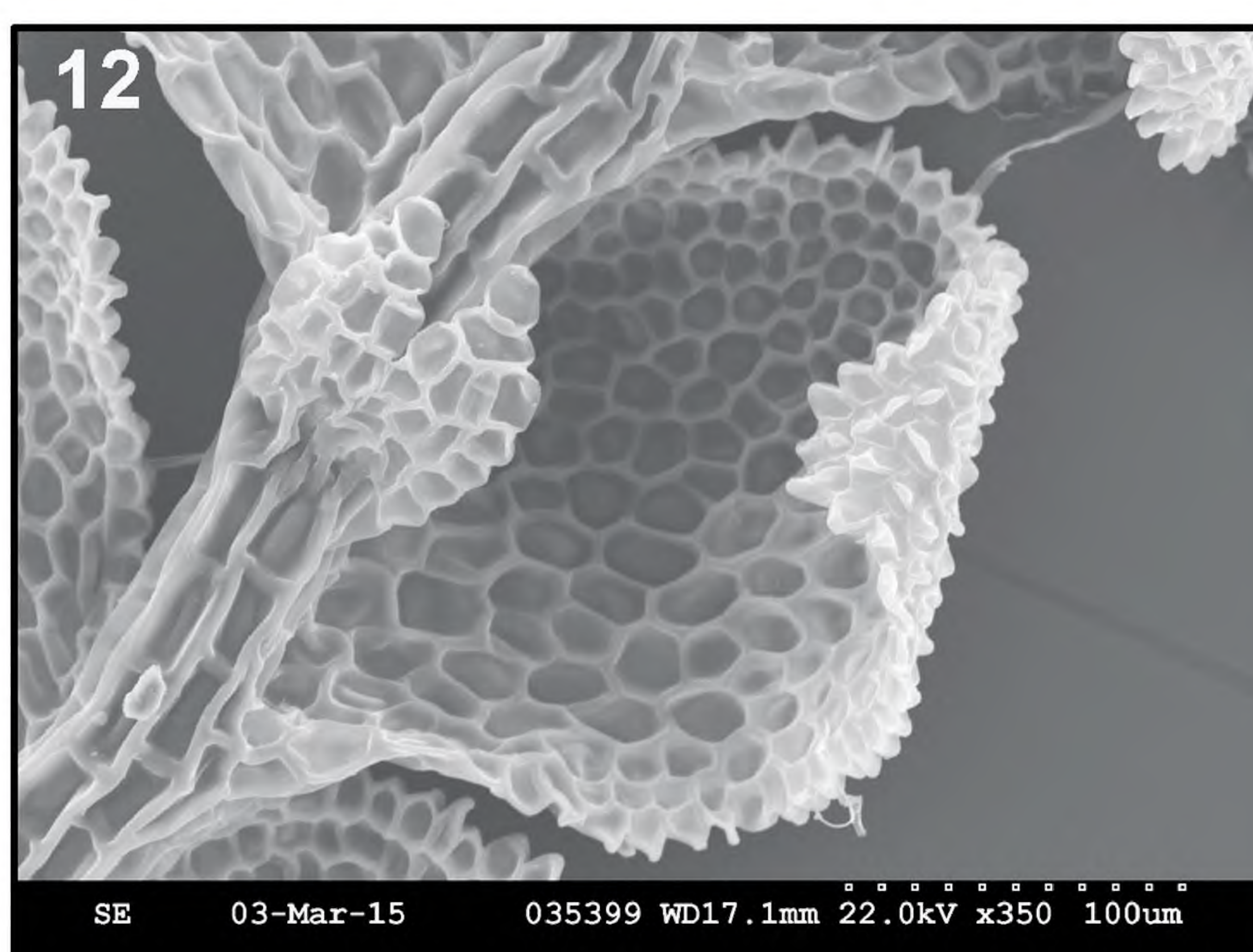
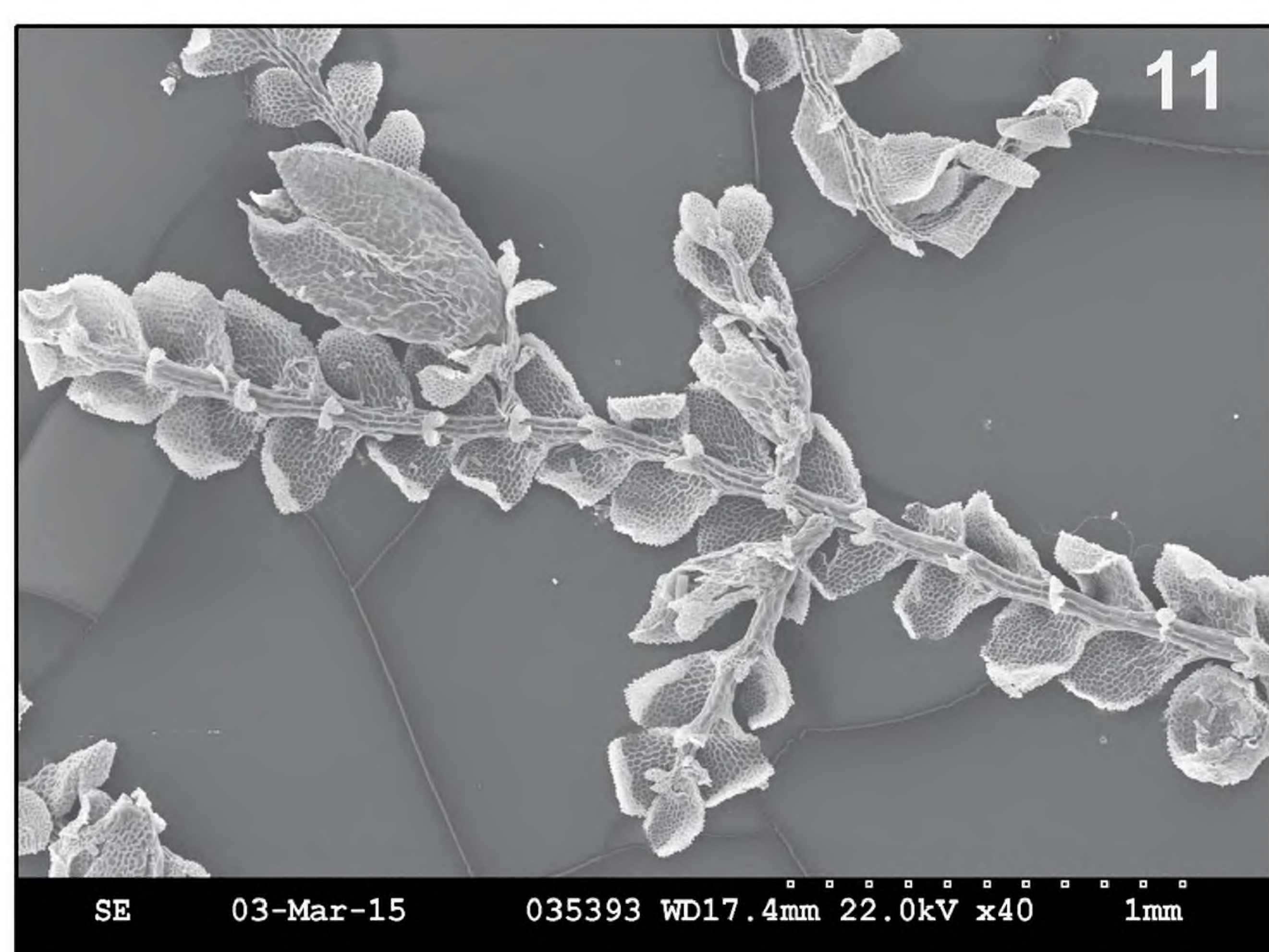
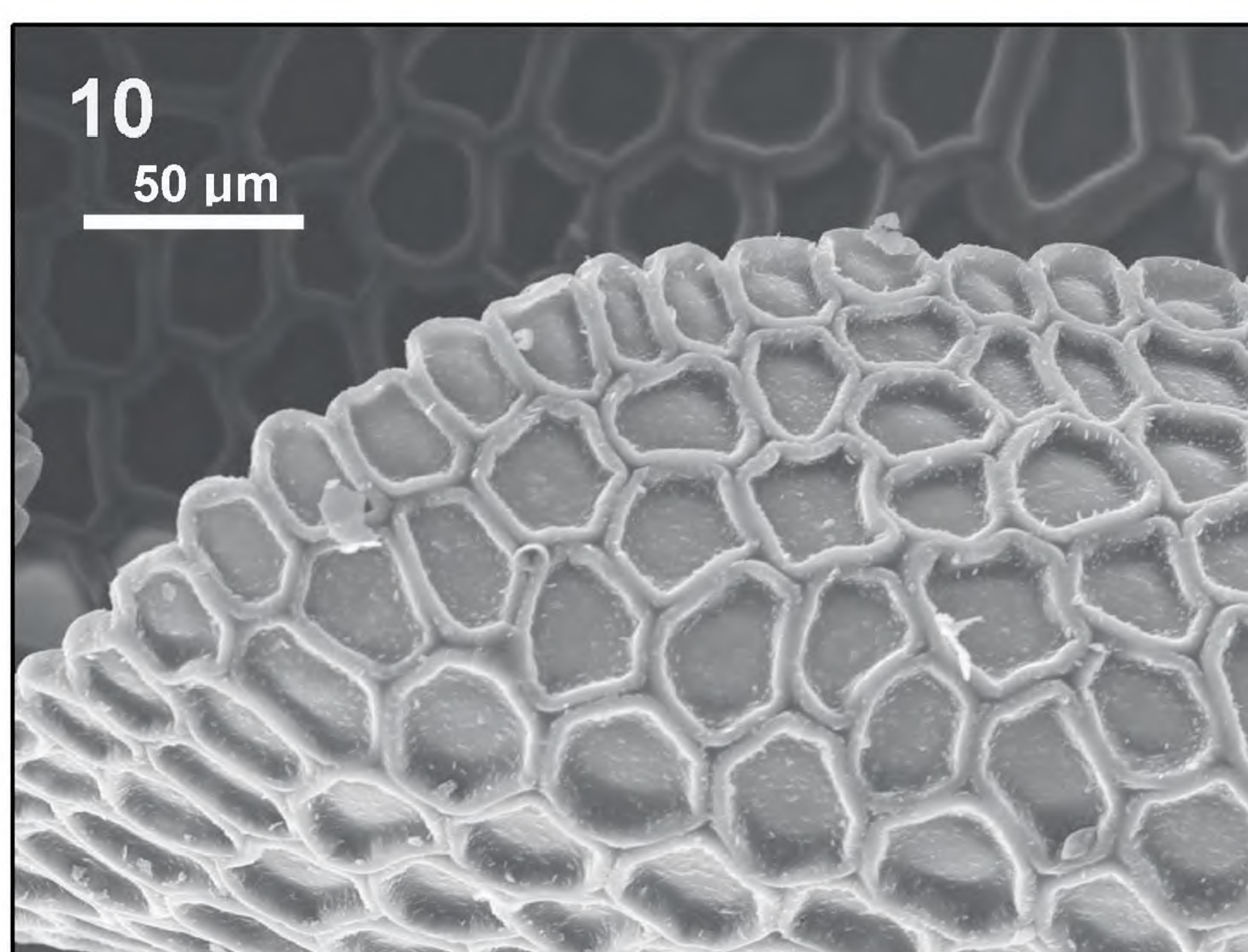
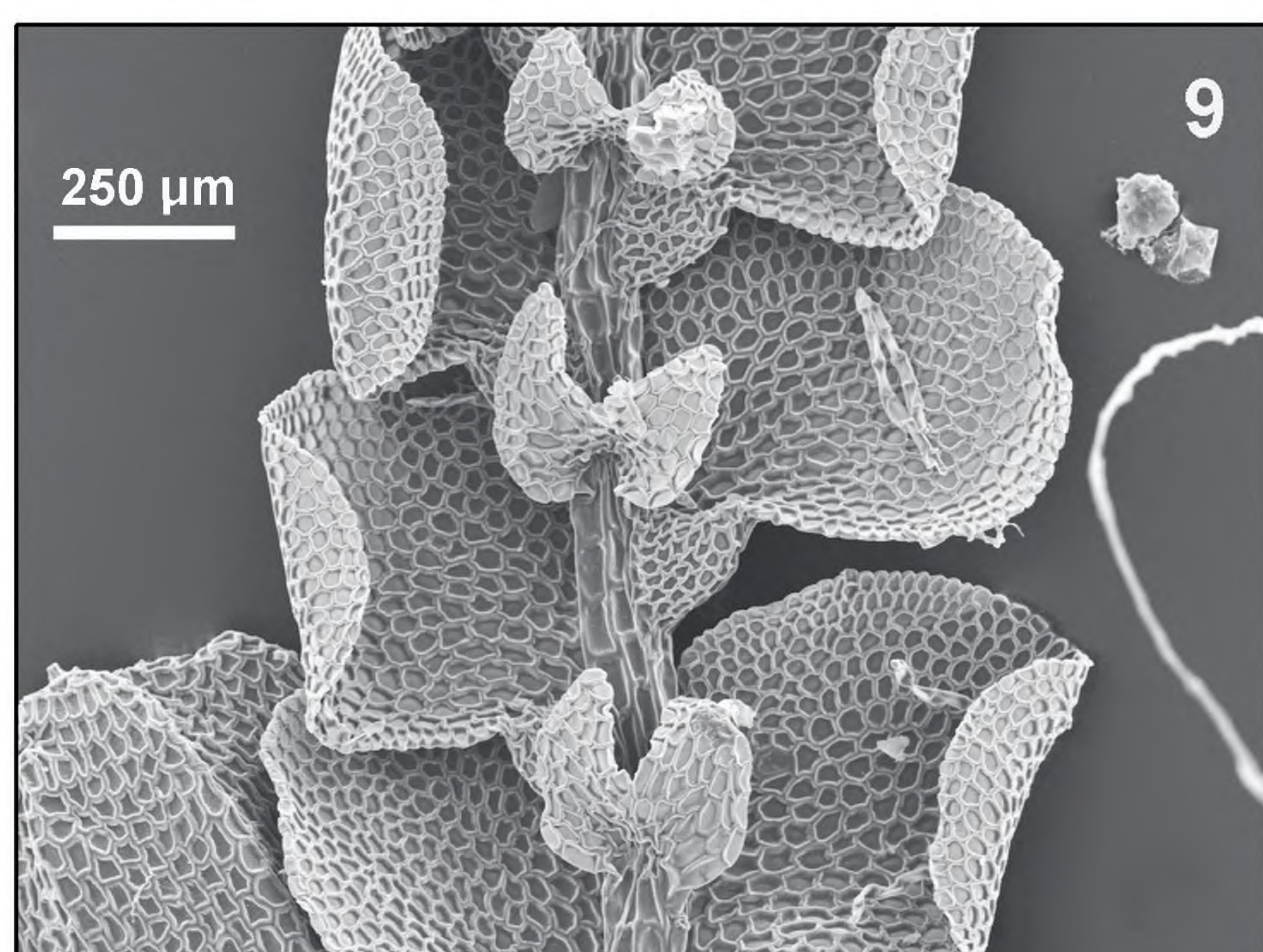
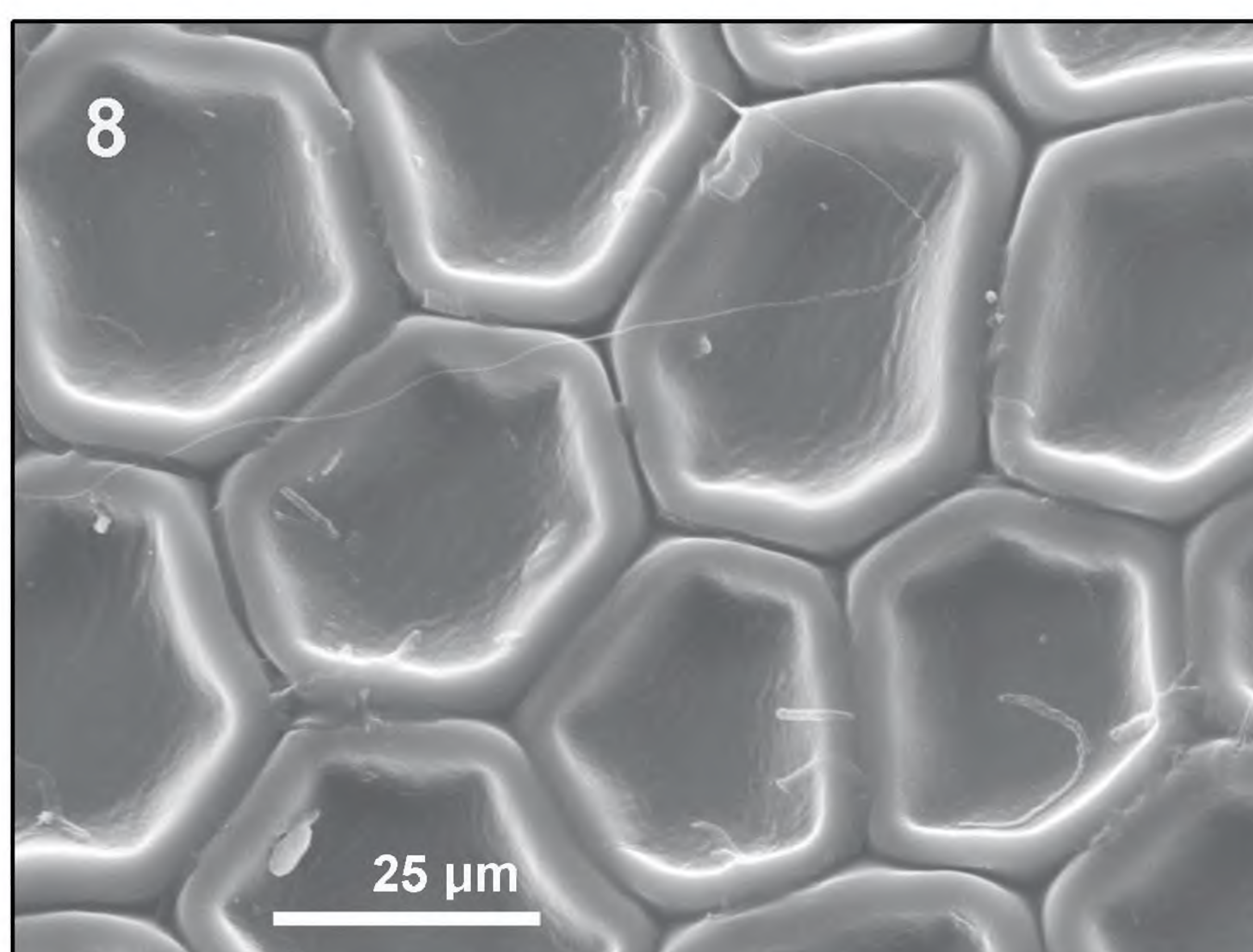
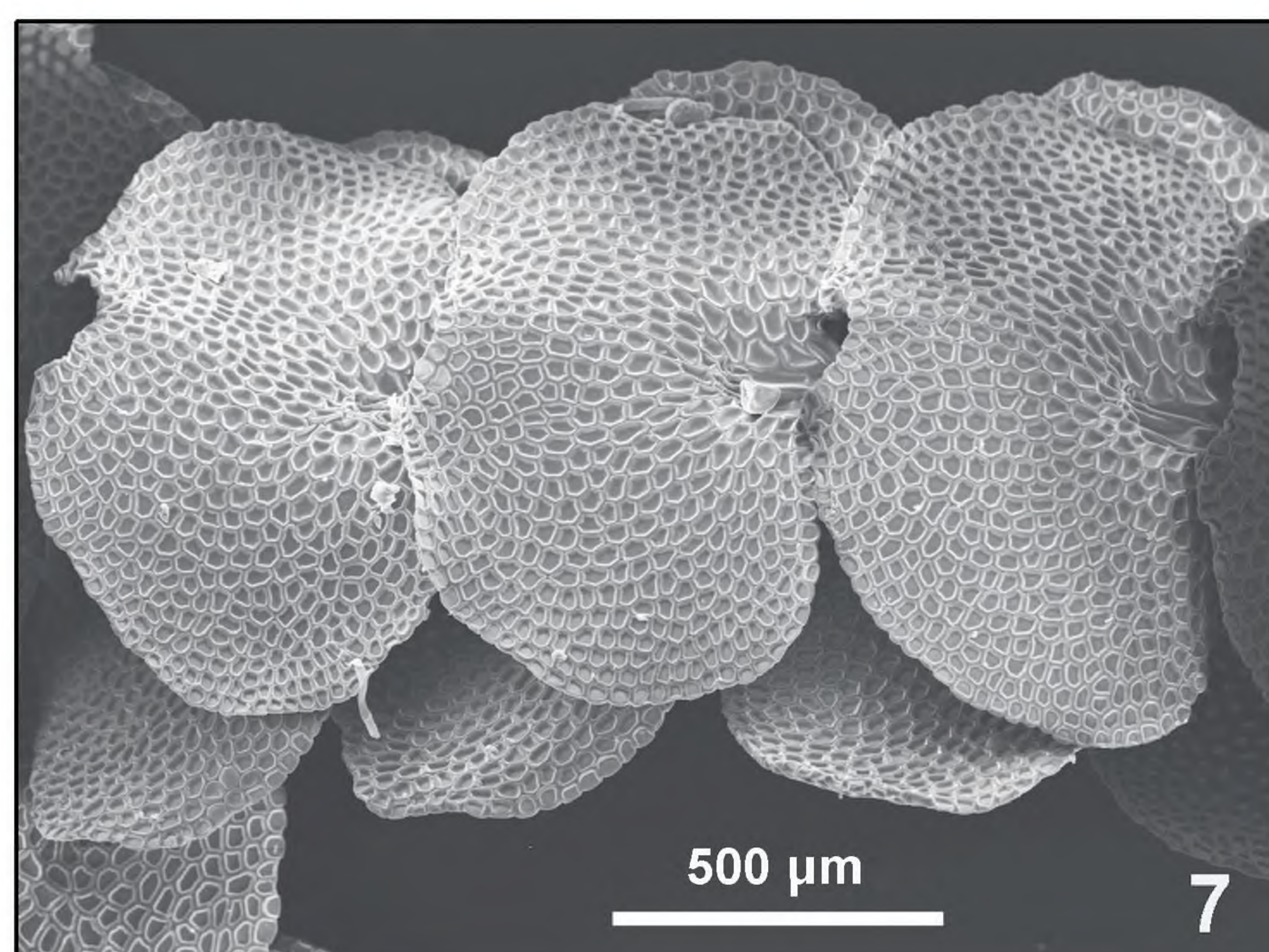
***Lejeunea lumbricoides* (Nees) Nees, 1845**

References: Stephani (1914: 561, as *Hygrolejeunea graeffeana*), Ov; Hürlimann (1993: 11); Söderström et al. (2011: 419); Lee (2013: 442); Vi, where we collected at 990 m alt. Altogether five records from the islands.

Illustrations: Mizutani (1970: 239, fig, VIII); Lee

(2013: 441, figs 296-314).

Distribution: A Malesian-Pacific species distributed from Java to Fiji, growing usually as hanging epiphyte in montane rainforests above 1000 m.



Figures 7-12. Fijian *Lejeunea* species. 7-8: *Lejeunea* cf. *sordida* (Nees) Nees aff. *L. leratii* (Steph.) Mizut. from Pócs 03285/L: 7 – Ventral view; 8 – Cuticle; 8-9: *Lejeunea patersonii* (Steph.) Steph. from Pócs 03282/AE; 8 – Ventral view; 9 – Marginal cells; 11-12: *Lejeunea reineriae* Ilkiu-Borges from Renner & Rakoro 5440 and from Söderström 2011/032: 11 – Renner & Takoro 5440; 12 – Söderström 2011/032.



***Lejeunea micholitzii* Mizutani, 1970**

References: Hürlimann (1993: 12), Vi; Söderström et al. (2011: 419); Pócs et al. (2011: 478), Ka, Ta. Altogether from 12 localities at 460-1010 m.

Illustrations: Mizutani (1970: 237, fig. VI); Lee (2013: 443, figs 315-333).

Distribution: Malesian-Pacific species known from Sri Lanka to the Philippines, Vanuatu and Fiji.

***Lejeunea mimula* Hürlimann, 1993** (Figs 5-6)

References: Hürlimann (1993: 12); Söderström et al. (2011: 419), VL.

New records: New to Ka: Mt. Delainabukelevu (Mt. Washington), cloud forest, 550-650 m, on bark and on leaves. A. Sass-Gyarmati 1177/AL, L. Söderström 2011/187; elfin forest 700-800 m, epiphyllous. M. von Konrat 1179/C. Altogether 16 records, most from Viti Levu Island at higher elevations.

Illustrations: Mizutani (1970: 242, fig. XI); Lee (2013: 449, figs 350-363).

Distribution: Malesian-Pacific species distributed from Java to Fiji.

***Lejeunea neelgherriana* Nees in Gottsche, Lindenberget Nees, 1845**

New records: New to Fiji Islands: J. Larraín & M.A.M. Renner 36175. The only specimen was collected from the islands.

Illustrations: Zhu & So (2000: 150, fig. 1).

Distribution: Known from Sri Lanka, India, Nepal, Bhutan, Southern China, Korea and Japan (Zhu & So 2001).

***Lejeunea papilionacea* Prantl, 1892**

New records: New to Fiji Islands: Ta, SW part of the island, on foothills between Salialelevu and Naqarawalu villages, in degraded rainforest at 100-200 m alt., on branches. S. & T. Pócs 03296/F p.p. Along the road from Wairiki village to Des Voeux peak, at 715-750 m, epiphyllous in mossy cloud forest. S. & T. Pócs 03289/BZ p.p. Around Tavoro Waterfalls, above Korovou village, at 10-100 m alt., on bark in wet lowland rainforest. S. & T. Pócs 03282/G. VL: at the N edge of Nausori Highlands, W of Bukuya village. On treefern petiole in submontane rainforest at 570 m alt. S. & T. Pócs 03253/J.

Illustrations: Jones (1972: 41, fig. 8 l-m, g-k); Zhu & Grolle (2001: 334, fig. 2); Lee (2013: 454, figs 379-393).

Distribution: A species of Palaeotropic distribution, known from West Africa and the

East African islands through tropical Asia to Fiji (Wigginton 2009; Lee 2013).

***Lejeunea patersonii* (Stephani) Stephani 1915** (Figs 8-9)

References: Hürlimann (1993: 13); Söderström et al. (2011: 419), VL.

New records: New to Ta: NE side of Des Voeux (Devo) Peak, along the road from Vairiki village to the summit. Epiphyllous in mossy cloud forests at 715-1150 m alt. S. & T. Pócs 03279/BJ and BK; 03289/BZ p.p. Around Tavoro Waterfalls above Korovou village, at 10-100 m, in very wet lowland rainforest, on bark. S. & T. Pócs 03282/AE. Taveuni Estates above Saqulu village, on treefern stem in degraded submontane rainforest at 360 m alt. S. & T. Pócs 03290/J. Altogether 8 records from Fiji, from sea level to 750 m.

Illustrations: Lee (2013: 457, figs 394-410); Lee et al. (2014: 253, figs 21-29).

Distribution: Malesian-Pacific species distributed from Indochina to Tahiti (Lee 2013, 2014).

Notes: The record from Ovalau Island was based on the mistaken synonymy with *Microlejeunea samoana* Steph. in Miller et al. (1962), followed by Hürlimann and Söderström et al. (l.c.). Although Ovalau was considered to be a Samoan island by Stephani 1915, it really belongs to Fiji, as pointed out also by the above authors. *Microlejeunea samoana* is not synonymous with *Lejeunea patersonii*, but is a Fijian endemic species, as stated by Miller et al. (1962: 559), who studied its type. Only through further study it can be decided, whether it belongs to *Microlejeunea* or *Metalejeunea*.

***Lejeunea pulchriflora* (Pearson) G.E. Lee, Bechteler, Pócs, Schäfer-Verwimp et Heinrichs, 2016** (Figs 13-14)

= *Taxilejeunea pulchriflora* Pearson 1924, *Lejeunea tamaspocsii* G.E. Lee in Lee and Gradstein, 2013

New records: New to Fiji Islands: Ka, summit of Mt. Delainabukelevu (Mt. Washington), epiphyllous on Blechnum leaves in elfin woodland at 700-800 m alt. E.A. Brown & M. von Konrat 1178/T, 1179/C and E p.p.

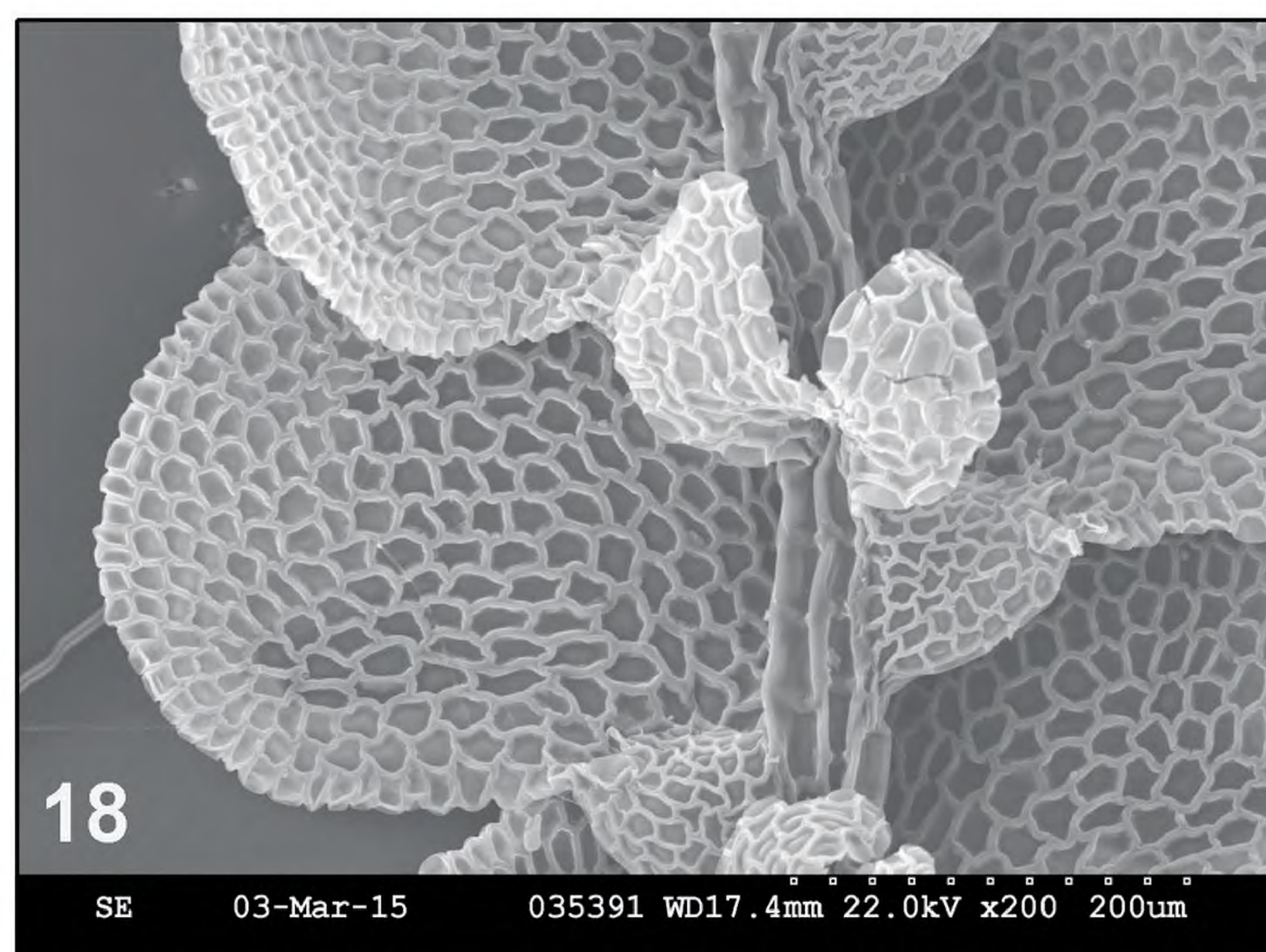
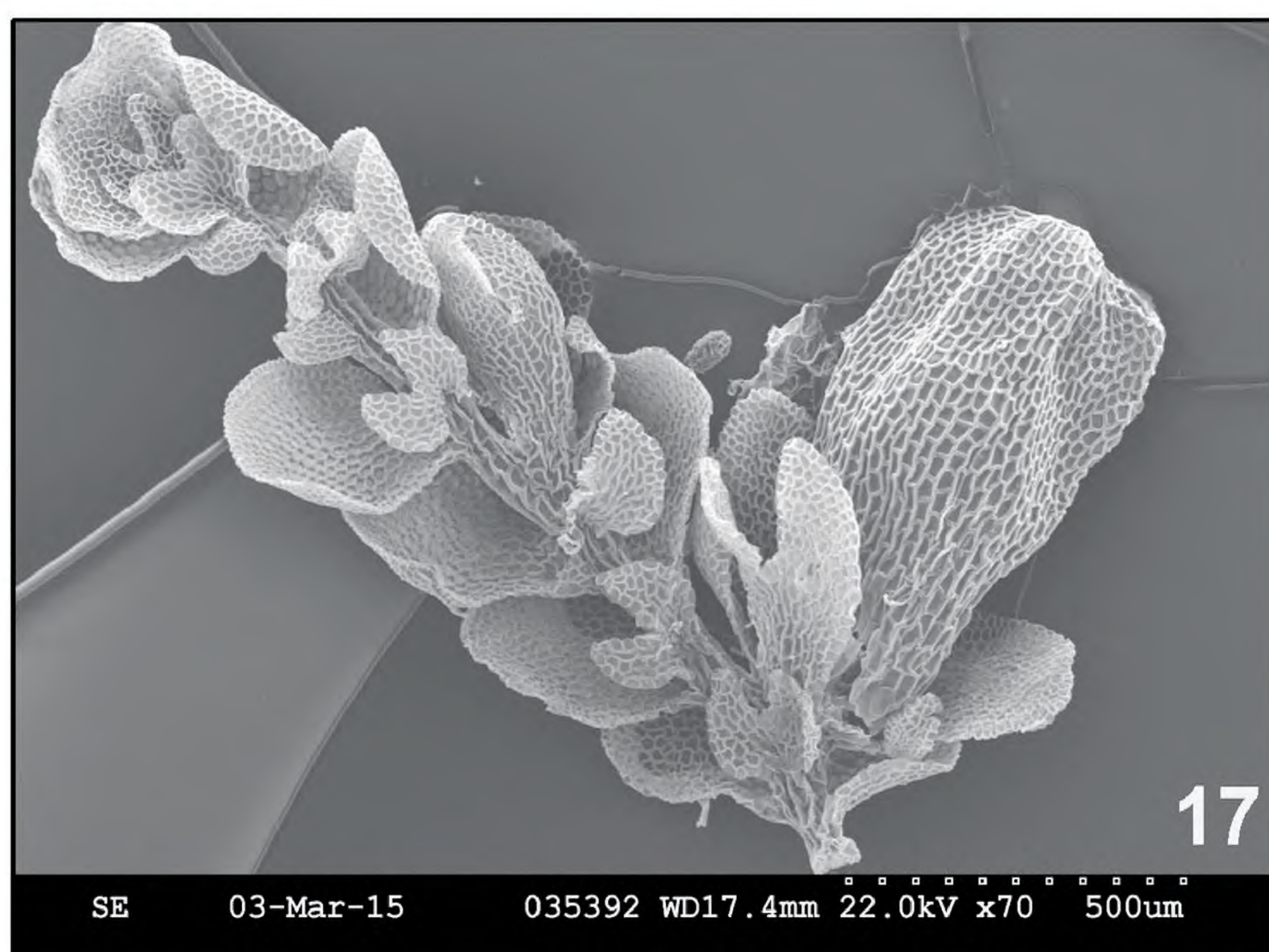
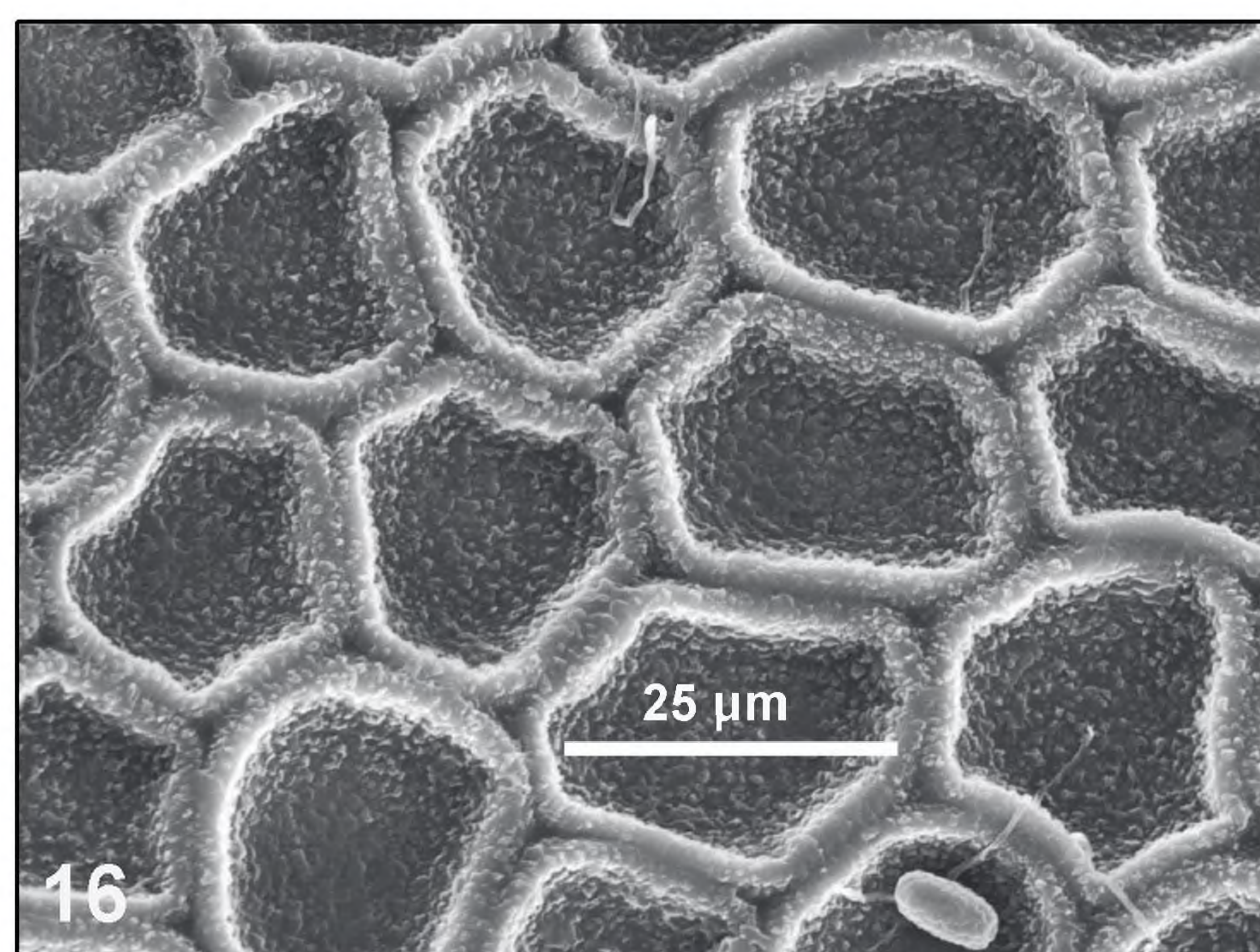
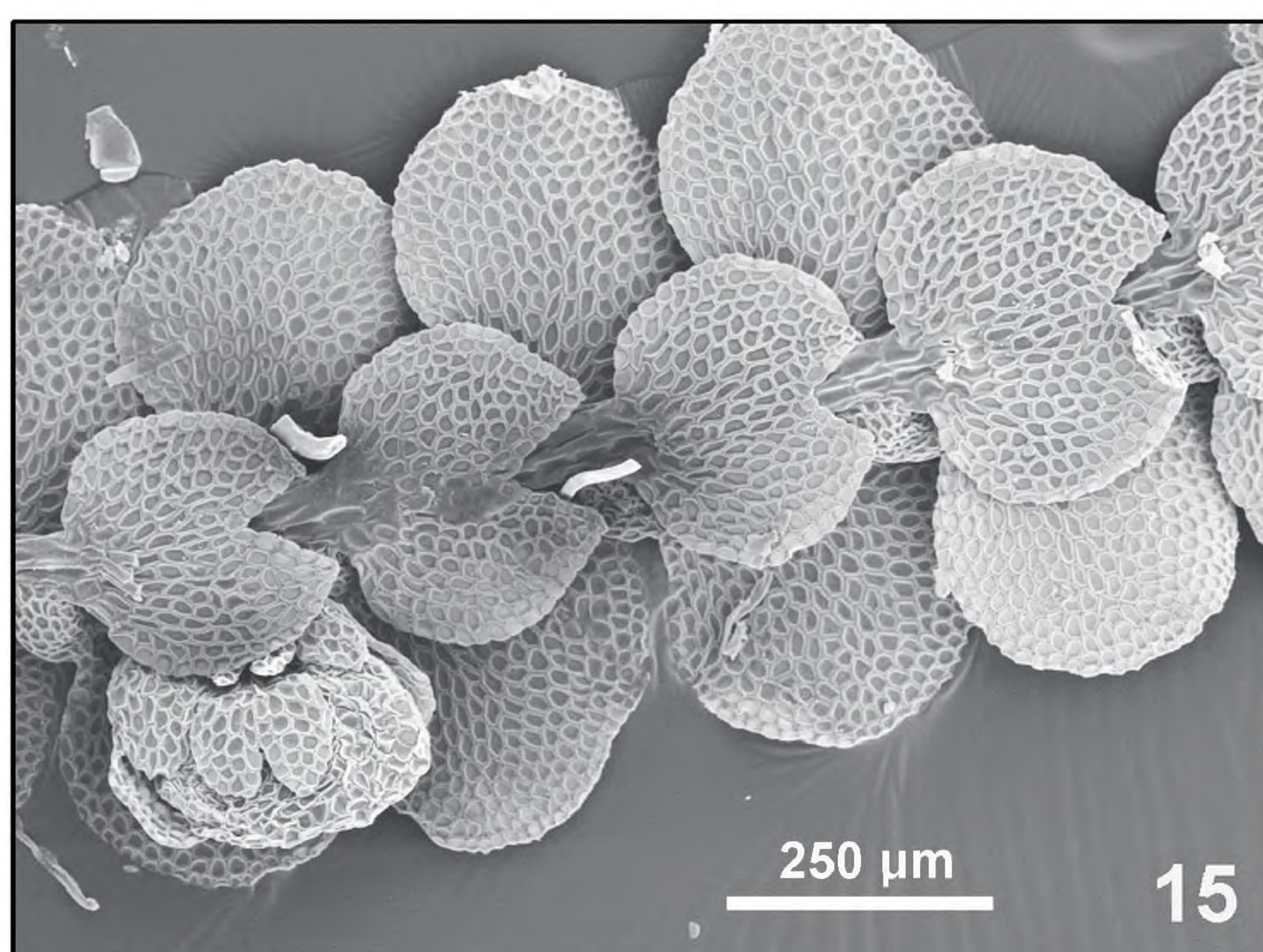
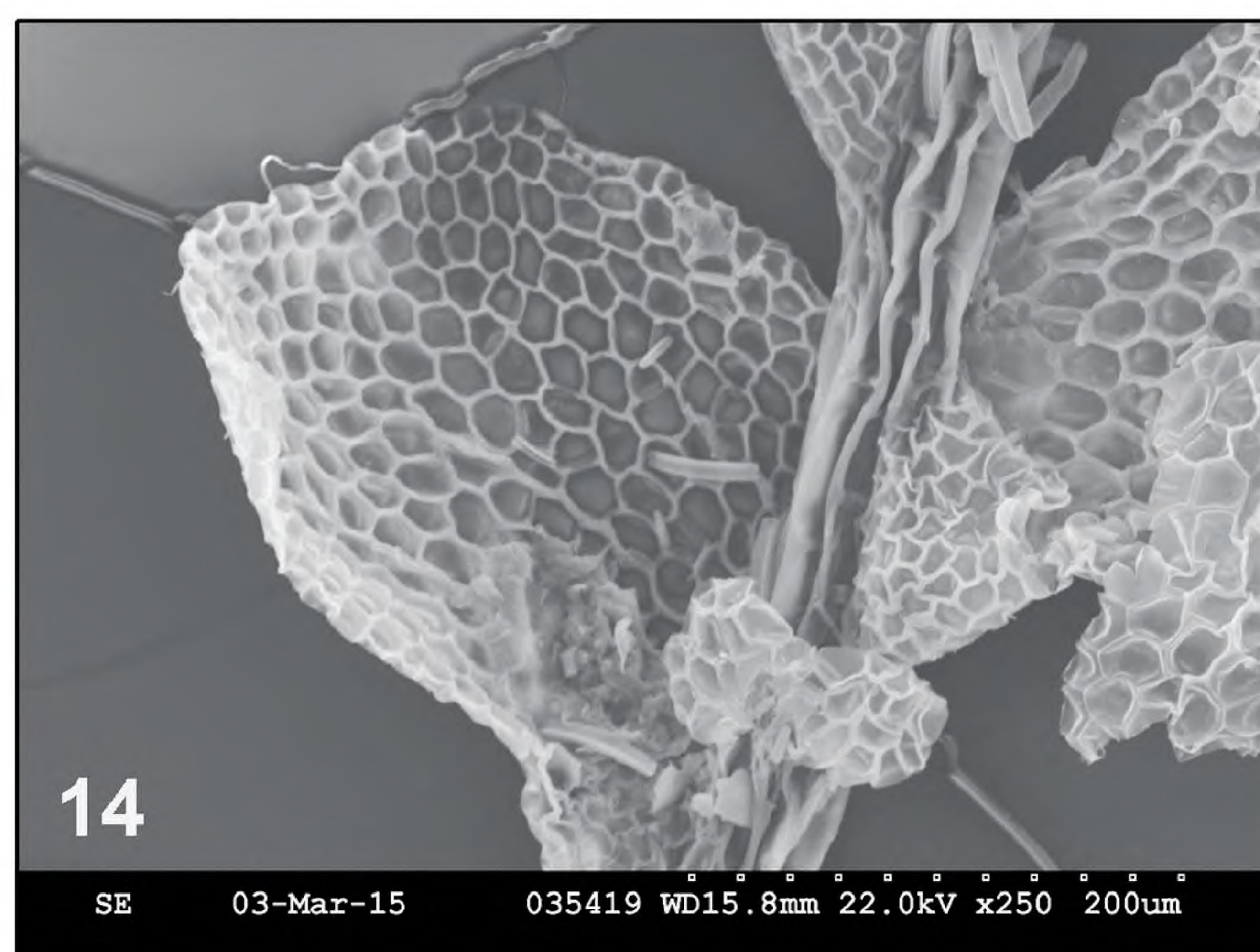
Distribution: Distributed in the mountainous areas of tropical Africa, Malesia and the Pacific (see map in Lee et al. 2016).

Illustrations: Lee (2013: 470, figs. 477-492), as *L. tamaspocsii*; Lee et al. (2016: 15, fig. 1).



***Lejeunea reineriae* Ilkiu-Borges, 2005** (Figs 11-12)
 = *Echinocolea herzogii* Mizutani, Grolle, 1964.
 New records: New to Fiji Islands: Vi, Coral Coast near Nabukavesi village, 10 km N of Lombau. On emerged streambed rocks in wet lowland rainforest, 30-60 m. S. & T. Pócs 03261/AC. NE escarpment of Rairaimatuku Plateau, above Naqelewai village.

On bark in a secondary submontane rainforest at 700 m. S. & T. Pócs 03272/C. E spur of Mt. Delaitoga ridge along the Nabukavesi-Namosi road. On bark in cloud forest at 430 m alt. A. Sass-Gyarmati 1153/AK. Sovi Basin, Waiambo Stream above Nadakuni and Raravatu village, vicinity of Naimimilulu rock. On side of boulder on edge



Figures 13-18. Fijian *Lejeunea* species. 13-14: *Lejeunea pulchriflora* (Pearson) G.E. Lee from Brown & von Konrat 1179/C: 13 – Perianth; 14 – Ventral view; 15-16: *Lejeunea sordida* (Nees) Nees from Pócs 03303/R: 15 – Ventral view; 16 – Cuticle ornamentation; 17-18: *Lejeunea umbilicata* (Nees) Nees from Pócs 03301/B: 17 – Habit with perianth; 18 – Ventral view.



of watercourse in riparian rainforest at 150 m. M.A.M. Renner & F. Rakoro 5440 (NSW 889642), L. Söderström 2011/032 and /040. Altogether 4 localities in Fiji, from sea level to 700 m.

Illustrations: Ilkiu-Borges (2005: 62, fig. 8).

Distribution: A Malesian-Pacific species previously known only from Sulawesi, New Britain and New Caledonia (Ilkiu-Borges 2005; Thouvenot et al. 2011).

***Lejeunea sordida* (Nees) Nees, 1838** (Figs 15-16)

References: Hürlimann (1993: 14), Vi; Söderström et al. (2011: 420); Pócs et al. (2011: 478) Ka, Ta.

Widespread in Fiji Islands on all substrates from sea level to 990 m alt., but mostly in lowland forests below 300 m. Altogether 39 localities from Fiji.

Illustrations: Mizutani (1970: 243, fig. XII); Zhu & So (2001: 142, fig. 55); Lee (2013: 465, figs. 446-462).

Distribution: Known as a Malesian-Pacific species distributed from Indonesia and China through the Philippines, Australia and New Guinea to Samoa and Micronesia (Zhu & So 2001; Lee 2013).

Notes: A smaller part of *Lejeunea sordida* specimens has very small incision on the underleaf apex, being in this respect transitional towards *Lejeunea mimula*. Eifrig (1937) in his monograph of *Taxilejeunea* described and illustrated a similar plant as *Taxilejeunea patersonii* (Steph.) Eifrig, mistakenly based it on *Lejeunea patersonii* (Steph.) Steph. instead of *Hygrolejeunea leratii* Steph. Mizutani (1970) clarified its position and described it as *Lejeunea leratii* (Steph.) Mizutani, based on *Hygrolejeunea patersonii*. Both Eifrig and Mizutani distinguish the plant from *Lejeunea mimula* by its female inflorescence usually with 1 subfloral innovation (instead of 2 in *L. mimula*) and by its short cylindrical beak of perianth (instead of funnel shaped in *L. mimula*). As these types of Fijian plants are sterile (and their cuticle is smooth), we classified this doubtful taxon within *L. sordida*, until fertile plants will be found (Figs 7-8).

***Lejeunea subigiensis* (Stephani) Stephani, 1896**

References: Campbell (1971: 15), Ov, VL.

New records: New to Ta: SSE coast, WSW of Navakawau village, epiphyllous in *Barringtonia asiatica* dominated coastal forest, at 8 m. S. & T. Pócs 03292/L. Altogether 5 records from the islands.

Distribution: Malesian-Pacific species occurring in Taiwan, Borneo, Philippines, Fiji and Samoa (Miller et al. 1983).

Notes: According to Zhu & So (2001: 159) it is

extremely similar and not easily separated from *Lejeunea anisophylla* and the only difference is the presence of regenerants at the leaf margin of *Lejeunea subigiensis*.

***Lejeunea tuberculosa* Stephani, 1915**

New records: New to Fiji Islands: Vi, Naitasiri Distr., Ulvi Nakoba, vicinity of transmission station at summit, at 460 m alt. On bark at forest edge of mesophyll rainforest. M.A.M. Renner 5327 (NSW 889314). The only record is known from Fiji.

Illustrations: Mizutani (1971: 452); Jones (1972: 34), as *Lejeunea camerunensis* Stephani; Lee (2013: 473).

Distribution: Widespread Palaeotropical species distributed throughout tropical Africa, Asia and the Pacific (Lee 2013: 475).

***Lejeunea umbilicata* (Nees) Nees in Gottsche, Lindenberg et Nees, 1843** (Figs 17-18)

= *Lejeunea cuculliflora* (Stephani) Mizutani, 1970

References: Jack & Stephani (1894), Eifrig (1937) as *Taxilejeunea umbilicata* (Nees) Spruce, OV; Jack & Stephani (1894), as *Taxilejeunea umbilicata*, Vi; Södersdtröm et al. (2011: 420); Pócs et al. (2011: 479), TA.

New records: New to Ka: 2-3 km NNE of Vunisea, along Namara road on rocks below waterfall, at 100-150 m alt. S. & T. Pócs 03301/BJ. Altogether 17 localities in Fiji Islands on different substrates, from 10-1150 m alt.

Illustrations: Mizutani (1970: 235); Lee (2013: 476).

Distribution: Malesian-Pacific species distributed from Sumatra to the Philippines and Samoa.

***Lejeunea* sp. nov. 1**

A species with pluricellular first tooth. Only known from the type, growing on half woody *Piper* stem: Vi, Rairaimatuku Plateau, 855-945 m alt.

Seems to be endemic of Fiji Islands.

***Lejeunea* sp. nov. 2**

A species with epicate perianth. Only known from Fiji, growing as epiphyllous and ramicolous in montane rainforest and mossy (cloud) forest, Ta, Vi, 600-950 m alt.

Seems to be endemic of Fiji Islands.



Phytogeographical evaluation

Interestingly the distribution pattern of the species of Fijian *Lejeunea* Libert (1820) is quite different from the distribution pattern of the species of *Cololejeunea* (Spruce) Stephani (1891) of the same islands (Pócs 2012). The proportion of the widely distributed multicontinental pantropical elements is much lower in *Lejeunea* than in *Cololejeunea* (4 vs 16%). The explanation might be in the presence of commonly developing discoid gemmae in *Cololejeunea*, probably suitable also for long range air dispersal. On the other hand, the ratio of Malesian-Pacific species is higher in *Lejeunea* (33 vs 7%), what probably can be explained by step by step dispersal in this genus more pronounced than long range air dispersal. The other explanation should be the different age of the genera (Wilson et al. 2007; Feldberg et al. 2014), but in this case the older (Palaeocene) *Lejeunea* species should be more widespread than *Cololejeunea* of Oligocene origin, adapted later to the epiphyllous life style.

The above relationships appear in the list and diagram below (Fig. 19):

- Fijian endemics – 3 species: *Lejeunea crassiretis*, *L. sp. nov. 1*, *L. sp. nov. 2*.
- Southern Pacific – 2 species: *Lejeunea*

caviloba, *L. gracilipes*.

- Malesian-Pacific – 9 species: *Lejeunea eifrigii*, *L. lumbricoides*, *L. micholitzii*, *L. mimula*, *L. patersonii*, *L. reinerae*, *L. sordida*, *L. subigiensis*, *L. umbilicata*.
- Indomalesian-Pacific – 6 species: *Lejeunea apiculata*, *L. cocoes*, *L. discreta*, *L. exilis*, *L. neelgherriana*, *L. flavida*
- Southeast-Asian – 1 species: *Lejeunea compacta*.
- Palaeotropical – 5 species: *Lejeunea alata*, *L. anisophylla*, *L. papilionacea*, *L. pulchriflora*, *L. tuberculosa*.
- Pantropical – 1 species: *Lejeunea flava*.

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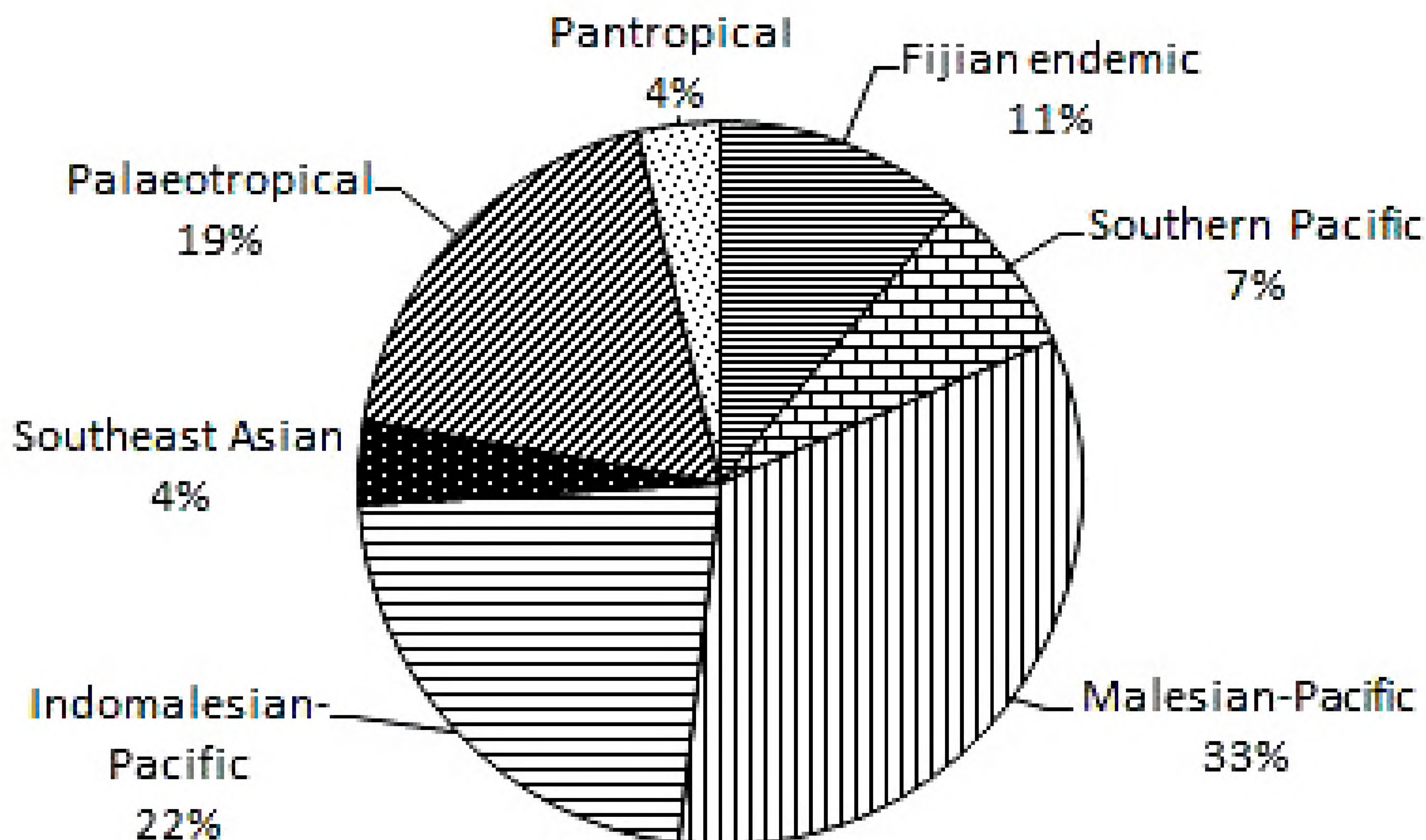


Figure 19. Distribution types of Fijian *Lejeunea* Libert (1820) species.



Natural Science Foundation of China (Grant No 31400190).

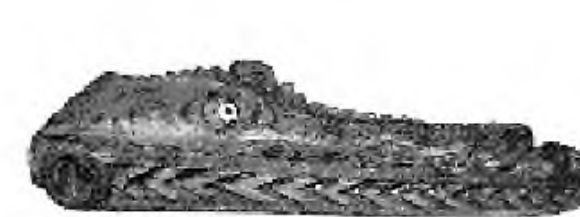
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